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are the reaction forces resulting from the panhard rod link, which locates the rear axle ... Equation (15) assumes that inertial forces due to lateral wheel ..... [2] Ray, L.R., 1997, Nonlinear tire force estimation and road friction ... [10] Murakami, T., Yu, F. and Ohnishi, K., 1993, Torque sensorless control in ...

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collision detection/reaction + motor friction compensation. □. Conclusions .... include friction (difficult to estimate) in the model .... motor inertia reduction based on joint torque sensing leads to .... De Luca, Mattone: Sensorless robot collision detection and hybrid force/motion control., ICRA'05 ...

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from these receptors to estimate the position and contact force at the end of the .... exchanging friction for inertia. These control limitations put even more .... rotation  $\dot{\theta}$  be sensor-less. This structure of transformations allows ..... we might consider computing the net reaction force by vectorially adding ...

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magnetic force during assembly to place the PM rotor into position in a controlled ..... This section is to estimate the stator resistance and its self ..... friction load. Therefore, no power or only a very small amount of power is ..... Development of sensorless control. The main task of this section is to ...

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Here, the estimation of the friction compensation torque (  $\tau_f$  ) poses a very difficult problem. .... robot arm is influenced by the reaction force from the ...

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friction rather than inertia takes a dominance. Prof. .... the state estimation error. Conventional adaptive observers use just the state estimation ... identifying some magnetic parameter uncertainties and sensorless MSL by monitoring the ..... only by friction. If the reaction force generated is greater than the ...

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and friction stick-slip displayed in the force signal. .... forces in manipulation are con- guration space constraint reaction forces. .... produced several areas of work: sensorless manipulation, probabilistic manipulation, ..... inertia is a direct application of estimation techniques in robot calibration and adap- ...

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A sliding mode observer is used to estimate the friction coefficient. .... The tire reaction force will generate a torque that resulted ... tire friction force  $\times F$  : moment of inertia of the wheel ..... Thus enables of sensorless control where the rotor speed is estimated based on stator voltage equations and ...

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capable of rotational and translational motion estimation. .... C controller was specially designed for the sensorless outrunner LRK195.03 .... Rotors Inertial Counter Torque. These terms result from the reaction torque produced by a ... The friction force on the propellers resulting from horizontal linear motion ...

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Figure 3-22: Response of friction estimation and error for both M ..... sensors, absolute optical encoders, resolvers or some form of sensorless position ..... Inertia of motor shaft, low speed rotor, and load rotor .... which led to expressions for the friction force caused by the viscosity of lubricants. The ...

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The admittance is set to have a purely damped reaction, so the ... the use of sensor-less methods such as ones based on motor- ... The observation of motor current to estimate the force interaction was studied ... gravitational and friction effects, influences the robot behaviour in a ...  $B$   $q$  is the inertia matrix, ...

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moment of mass inertia  $J_x$  with respect to axis  $x$ . – example cylinder: ... estimation of friction torques by means of friction coefficients  $\mu$  ..... sensorless commutation only for continuous operation at high speeds ..... coefficient of friction on support ca. 0.3 friction force (empty belt) ca. 40 N feed velocity ...

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motor torque acting on the motor inertia  $B$  and the friction torque.  $K = \text{diag}\{k \dots \text{velocity estimation}\}$ . By choosing a slow filter constant for ..... [15] —, "Sensorless Robot Collision Detection and Hybrid Force/Motion ...

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include inertia, friction, stiffness, backlash, singularities, force bandwidth, .... is the reaction force exerted by the grasper while grasping the tissue, ..... friction estimation, cable stretching, and other characteristics of the mechanism that ..... led to the advantage of

sensor-less jaws and modularity. ...

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be well justified for quasi-static systems where the objects move slowly enough that the contact reaction forces dominate the moments of inertia. ...

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suming flat ground) through friction, incurring an essentially .... the ground reaction force on the leg, resulting in effective force and torque vectors acting on the center of mass.

For .... with the sensorless feedforward extreme, which, when RHex .... estimation of the rotor temperatures to avoid motor damage, ...

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This platform controls a sensorless 3-phase Brushless Sinusoidal .... FLUX PHASE  
ESTIMATION TECHNIQUE. .... 4) The single shunt configuration forces the designer to  
reduce the PWM frequency. .... represents friction, "J" the inertia, "τ" ..... accurate speed  
showing a fast reaction time and good system dynamics. ...

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linear friction and elastic deformation of gears ..... •An additional state variable readily  
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INDUCTION MOTOR: ...

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reaction forces exerted by the manipulant at the controlled ...

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electromotive force generated by rotor movement is generally trapezoidal. These ..... machine and  $J$  is the moment of inertia of the rotor and its load. .... position sensorless algorithm for a surface mount PMSM. .... machine's internal temperature, and mechanical losses due to friction in the bearings may ...

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holding on its base, is needed so that the reaction forces of this model can be .... [44] used a modified Karnopp model for needle friction estimation ...

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speed control and rotor resistance estimation are then compared to those of a classical PI controller. .... where  $J$  is the moment of inertia,  $f$  the viscous friction ..... Figure 6d shows the controllers reaction to rotor resis- ..... [15] VAS, P. : Sensorless Vector And Direct Torque Control, Oxford ...

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transportation, inertial navigation, and super conductive bearings are represented. .... expression is developed for the calculation of the friction coefficient ..... and forces) and the estimation of the leakage parameters (coil and ..... In this paper, we propose both driving and lateral sensorless control ...

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The reaction force is viewed as another form of interaction. .... their result, Erdmann and Mason 6 constructed a planner that employs sensorless tilting ...

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slotless motor more suitable to be controlled by a sensorless drive. .... order to interact with the armature reaction flux to produce motor ..... which can be attributed due to the differences in estimation of peak current ..... current is required in order to overcome friction and inertia in the machine. ...

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increased, the transfer will decrease because of inertia. .... that arise as reaction forces



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of foot contact and joint kinematics, involving friction, deformation, and possible ..... body mass and inertia, individual leg ground reaction forces, .... over, whereas reflexive (sensorless) postures are empirically observed to anchor the ..... [203] T. Kiemel and A. Cohen, Estimation of coupling strength in ...

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is a wheel's moment of inertia about its rotational axis,  $p$  is total bicycle mass,  $R$  ..... that the resulting system will be stable without this estimation—the previous argu- ..... accentuate the friction reaction force. These wheels were chosen because they have ..... An exploration of sensorless manipulation. ...

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normal forces as well as dependence of the friction coefficient on velocity. The Stribeck friction .... inertia and time delay of the controlled plant, grey predictor is ..... paper presents a sensorless guidance control by detecting the ..... current estimate of its location, using the map: updates the ...

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ply voltage induces an Electromagnetic Force (EMF) in ..... reaction of the two fields gets the shaft rotating. ... This motor type is ideal for very high inertia loads, ..... friction and windage losses increase significantly. Due ..... main research focus is in the area of a sensorless approach. ...

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external force sensors. REACTION ENGINEERING. REACTOR ENGINEERING ..... estimation for catchment models; urban hydrology and water quality; information ..... measurement of surface skidding friction is also available. .... sensorless control strategies for induction, ..... integrated GPS and inertial systems. This ...

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Opening the input will cause labeled drive reaction. .... Without external capacitors, as an estimate, a power dip of 1 cycle (16.6ms @ 60Hz) ..... Based on inertia and friction values, the drive will calculate the speed loop gains (Speed P and ..... The drive operates with a sensorless control mode. An encoder ...

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porates friction and restitution, and analyzes the dynamics that occur during a .... tion, plus the dynamic state of the bodies is used to estimate a time of impact ..... the body inertia tensor are all equal, as is the case for a uniform ..... impulses model a constant reaction force which does no work on the ...

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The procedure may take a few minutes, depending on inertia and friction values. ... Regulation mode = Sensorless vect. Go to BASIC MENU and set Regulation .... Increase Current P until the reaction time is approximately 1 ms and the ..... Parameters computed in (b) are an estimate, they can be overwritten if ...

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speed, possibility of sensorless control and a possibility to achieve a better or ..... which facilitates an accurate estimation of the rotor position. .... energy carrying in the inertia mass and by the smaller relative slip ... The interception with the zero voltage axis is the sum of the friction and windage ...

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It forces the output frequency to be greater than commanded frequency while the drive's bus voltage is increasing ..... and Sensorless Vector operation. Enhanced Control drives support the ..... [Torque Estimate]. Estimated motor torque output as percent ..... the mechanics of the system (inertia, friction, etc). ...

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Not to be confused with Sensorless Vector above, Encoderless Vector ... Vector Control with encoder feedback utilizes Allen-Bradley's Force. Technology™. .... [DC Bus Memory] – displays an estimate of the full-load DC bus voltage. .... the mechanics of the system (inertia, friction, etc). ...

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inlet locations to estimate the ventilation needs in an ..... determined using a sensorless algorithm based on ..... force was masked by the inertia and friction force. .... The conceptualized process begins with the reaction ...

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of the field, changing attractive magnetic force into a repulsive one causing ... armature reaction, some back-EMF is still generated in the coils in the magnetic filed ..... stand for load torque, inertia and friction, respectively. .... estimation method of sensorless PM motor with no sensitivity to armature ...

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rolling friction of balancing balls of the Automatic Ball-type Balancer ..... are switched based on detection of the contact force. The stability ..... Sensorless schemes to estimate the spatial flux position control suffer however from a ... been modified with different error functions to test the reaction of ...

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heavy inertia load, it may take an hour or more for the system to come to a halt. For many ... simple mechanical friction, in the same way we stop a car. ... action of the armature mmf is called the armature reaction. [3] ..... The centrifugal forces at synchronous speed are already close to the limit the materials ...

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addition, a first order cost estimation will be quantified from a ..... The sensorless algorithm mentioned above consists of two operations: the ..... friction forces/torques and gear-mesh interface dynamics. .... understand how bubble pressure resists segregation in suspensions with continuous phase inertia. ...

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the surface reaction and surface tension. The large deformation of the liquid-vapor ..... an obstacle to fully utilizing this sensorless flow control strategy is the ..... inertia forces are on the same order or larger than interfacial ones. .... We estimate the power of pump and the friction drag of proboscis ...

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Particularly in control mode Sensorless Vector Control, the dynamics can be improved by estimating the ratio of inertia. C30 (J-mach/J-motor) and setting ..... posi.next is connected to BE3, the reaction occurs without a delay time. .... The effects of friction and inertia on the traction can be compensated for. ...

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equilibrium of three non-parallel forces, moment of force, couples of forces and their mo-  
... friction. Centre of area. Static moment of area. Moments of inertia of flat figures.

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netic friction force from the sliding region, stretching from the break-away ..... i.e., control  
systems often have an inherent resilience or inertia to data errors. .... system for  
commercial vehicles — additional sensorless function of the ..... Earlier work has mainly  
focused on estimation of indicated ...

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stability and state estimation are discussed in the next section. .... effects of the moment  
of inertia of the vehicle or of ..... tripped rollover in contrast to an un-tripped or friction  
rollover. The latter takes place on .... vehicle reaction is expressed in terms of lateral  
acceleration and roll angle. ...

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.....43 ..... in overcoming friction and electric circuit losses. There  
are ..... and moments of inertia of mechanical system. This feature is ..... When the force  
of shield reaction is significant, we can ...

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more inertia, so they move slower and they give more warning of their intent. .... For the  
sensorless brushless motor controller, the sensor ..... let this dry thoroughly, then friction-  
fit the tailboom into the body and the ..... This means the counterclockwise force (reaction  
of main rotor) will be greater ...

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inertia loads, where it is necessary to generate the pull-out torque at almost zero ... in the  
stator and rotor windings and losses in the bearing due to friction. .... In order to estimate  
the rotor flux vector is possible to use two different ... The usual terminology "Sensorless"  
specifies that no position/speed ...

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a high torque/inertia ratio. The shaft torque increases proportionately .... Both synchronous  
and SRMs require a position sensor unless new, sensorless technology is ..... electric  
motor cost estimation that would allow an examination of ..... 8.5:1 to minimize friction  
and windage losses and oil drag losses, ...

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